



EFFECTIVENESS OF BANNING PLASTIC BAG IN BANGLADESH FOR ENVIRONMENTAL PROTECTION

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Abstract

Ranging from degradation of air quality to increase in ocean toxicity, plastic bag contributes to disruption of ecosystem processes and the environmental attributes. Plastic bag is the cheapest and most available means to carry goods. However, mass use and improper disposal of this product generate severe environmental issues in developing countries. Bangladesh promulgated nationwide ban on plastic bag in 2002 as a protective measure for safeguarding environment and ecosystem. This study investigates the effectiveness of the ban in the south-west region of Bangladesh. A total of 180 randomly selected retailers from six upazilas of three districts in the south-west region of Bangladesh were surveyed taking one rural and one urban agglomerate from each district. More than three-fourths of the retailers provide plastic bag to the customers and only four percent retailers provide jute bag. Our findings suggest that the efficacy of authority to execute the ban is insignificant that generates the scope of violating the banning efforts of plastic bag. The retailers endorse that lack of alternative bag is the reason behind violating the ban on plastic bag. The logistic regression results suggest that frequency of raid by public authority, non-availability of alternative product, lack of knowledge regarding deteriorating impact of plastic bag on ecosystem and environment, and business license significantly influence the retailers to comply with the enforcement of banning plastic bag, whereas the proximity of shop to the main road provides room for non-compliance. This study suggests for easy availability of environment friendly bag, awareness among mass people and frequent raid from the authority which will contribute in environmental protection and ecosystem restoration through effectively enabling the ban.

Keywords: Plastic bag ban, effectiveness, retailer, consumer awareness, environment, Bangladesh

Introduction

In 1970's plastic bag was first introduced (Derraik, 2002). It gained enormous acceptance amongst consumers and dealers after the introduction. Every year people use and throw around 500 billion plastic bags (Spokas, 2008). The historians and archaeologists defined periods or ages on the basis of materials or technologies those affected mankind the most like: age of stone, bronze and iron. Accordingly, the ongoing period might be termed as the 'plastic period' for the prevalence of plastic (Chandrasekara & Kumar, 2016). Plastic which is made up of synthetic organic polymers were assumed to be harmless. But persistent use and unplanned disposal of it leads to environmental problems. Plastic is now commonly used in a variety of ways in both intermediate and final usages such as in garment industry, medical use, food preservation and packing, electronic products supplies, construction and so on (Lamont, 2005; Proshad et al., 2018). Every year people produce a large percentage of plastic as single-use, for disposable packaging of goods or products that is permanently thrown out within the year. In recent times variety of plastics are used and some of them are recycled as they are disposable in nature (Reddy et al., 2014; Jorgensen et al., 2021). Accumulation of plastic or

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plastic products disturbs wildlife, wildlife habitat as well as human which are major apprehensions for the environment and economies.

Throwing away plastic wastes is now documented widely as a major environmental problem (Proshad et al., 2018; Derraik, 2002), resulting detrimental effects on wildlife (Wilcox et al., 2015), and offers limited plastic removal options (Wilcox et al., 2015). Any type of such wastes such as plastic bags dumping openly at any location like along roadside, park or lands poses a risk to human health and environment because it creates soil pollution (Khajuria et al., 2011). If there is seen littering plastic bag everywhere on the street it is called 'white pollution' in China (Xing, 2009). The Mumbai flood in India is partly resulted from clogging the drains by plastic for which thousands of people died (Halden, 2010). To avoid such adversity Bangladesh has banned the plastic bags in 2002 (Spivey, 2003; Molla et al., 2018).

One of the main reasons of wide usage of plastic bag is its cheapness followed by its convenience to use. It has been investigated that after throwing directly to the environment, such bags persevere up to 1000 years or more to be degraded and thus pose disposal problem without being disintegrated naturally (Shenton & Stevens, 2001; UNEP, 2005). Use of such almost non-degradable substances damages environmental beauty (Verghese et al., 2009; Dikgang & Visser, 2012). In municipalities plastic bags block sewerage systems (Laist, 1997). As a result, tools like levies and taxes or banning are imposed to confine the use and production of plastic bags (Hasson et al., 2007; Ayalon et al., 2009; Clapp & Swanston, 2009). But they are not so effective thus voluntary activities have also been taken in some countries to decrease the use of plastic bag, more specifically to prevent plastic bag induced problems in environment.

To reduce plastic bag usage many countries are using command and control as well as market-based approaches after realizing their potential negative effects. Many studies recommend that the effectiveness of these countless interventions is definite and depend much on their implementation type (Shi & Koné, 2010). Ensuing this universal footstep, the Government of the People's Republic of Bangladesh promulgated a ban on providing single used polythene bags in Dhaka in the year of 2002 and after this a nationwide ban in the year of 2007 (Molla et al., 2018). Use of plastic bag may be controlled via several measures like recycling, ban on the production, usage and distribution or imposing tax. For the sake of economic and quality issues, research has found recycling as impractical (McKinney & Schoch, 2003; Miller, 2005). Given the backdrops, to govern the level of consumer consciousness and find out the reasons behind the non-conformity regarding the phenomenon, it is important to undertake proper strategies and accomplish tasks in a sustainable manner.

Available literature on Bangladesh and all over the world show how plastic bag pollutes environment and why it is so significant to ban this through law and enforcement. Thus, this article intends to trace out the effectiveness of plastic bag ban law in the south-west region of Bangladesh followed by two research questions:

1. To what extent people abide by the plastic bag ban ordinance? and
2. What are the reasons behind the nonconformity (if any) of the plastic bag ban law?

Materials and Method

Data source and study area: Data for this study were collected through structured questionnaire following multi-stage systematic random sampling procedure, picking 30 respondents from each of the 6 villages selected from Khulna, Jeshore and Satkhira district of the southwest Bangladesh. The villages are located in Batiaghata and Khulna Sadar upazilas in Khulna district, Jashore sadar and Abhaynagar upazilas in Jashore district and Satkhira sadar and Kolaroa upazilas in Satkhira district.

Study variables and measurement: The main dependent variable of logistic regression is probability of providing plastic bag by the retailers, measured by 0= retailer does not provide plastic bag and 1= retailer provides plastic bag to customers. The independent variables are: age of the respondent (in years), shop distance from main road (in km), shop size (in km) and so on. There are some independent variables measured in dummy form and Likert scaling to use in the regression. They are: whether shop keeper has license is measured in dummy (1=yes, 0=no), government gives raid and takes punitive measures for providing plastic bag and restrictions faced from consumers while providing plastic bag are measured by 5=very frequently; 4=frequently; 3=sometimes; 2=less frequently; 1=never. Availability of alternative bags, instead of plastic is measured by 5=very much; 4=much; 3=medium; 2=little; 1=very little.

Results

Summary Statistics

Most of the shops are in short distance from main road (Table 1). The minimum distance is only 0.001 km whereas the maximum distance of the shop from main road is 0.091 km. Government official in charge visits the market place to investigate any anomaly in the market regarding the ban. The average number of visits of the government official is around 4 in a year and it deviates by around 5 standard values from the mean. The number of visits vary from none to 24 in a year. The mean percentage of High-Density Polyethylene (HDPE) plastic bag is around 61 percent of the total bags provided by the retailers from his shop and it deviates by around 27 standard values from the mean. This result states that HDPE plastic bags are the most frequently provided to customers by the retailers.

Table 1. Summary Statistics

Variables	Unit of Mesuarement	Obs.	Mean	SD	Min.	Max.
Age of the Respondent	Number of Years	180	43.71	13.63	17	80
Family Member	Number of People	180	4.33	1.69	1	9
Education of the Respondent	Years of Schooling	180	7.76	4.08	0	18
Earning Members	Number of People	180	1.46	0.67	1	3
Shop Size	Square feet	180	176.5	154.4	10	750
Shop Distance from Main Road	Kilometer	180	77.58	79.45	4	300
Experience	Number of Years	180	11.23	8.52	1	40
Number of Government Visit	Number/Year	180	4.39	5.47	0	24
Television Watching Time	Hours/day	180	1.43	1.22	0	5
HDPE Plastic Bag	Percentage	180	61.15	27.42	0	100
LDPE Plastic Bag	Percentage	180	7.75	14.72	0	70
Net Bag	Percentage	180	15.72	20.53	0	95
Paper Bag	Percentage	180	10.28	13.84	0	70
Jute Bag	Percentage	180	3.56	8.16	0	60

SD= Standard Deviation, Min. = Minimum, Max. = Maximum.

Source: Authors' compilation based on field survey, 2020.

The average percentage of Low-Density Polyethylene (LDPE) plastic bag is around 8 percent of the total bags used by the retailers in their shop and it deviates by around 15 standard values from the mean. It indicates that the retailers are providing LDPE plastic bags less frequently to customers (0 to 70 percent cases). The average percentage of net bag is around 16 percent of the total bags used by the retailers in shop and it deviates by around 21 standard values from the mean. It indicates that net bag is hardly provided to customers by the retailers (0 to 95 percent cases).

The mean percentage of environmentally friendly paper bag is around 10 percent of the total bags used by the retailers and it deviates by around 13.84 standard values from the mean. The jute bag is one of the most eco-friendly bags and it is biodegradable. However, it is observed that the jute bag is used least among all the bags available in the market. The average percentage of jute bag is only around 4 percent of the total bags used by the retailers and it deviates by around 8 standard values from the mean. It indicates that jute bag is hardly provided to the customers. Many retailers claim that jute bag is much costly.

Hypothesis Testing

Table 2 shows that the practice of providing plastic bag by retailers for license holders is less than that of license non-holders and the mean difference is statistically significant ($p < 0.01$). So, there remains difference between license holder and non-holder in plastic bag providing behavior by the retailers.

Table 2. Hypothesis Testing

Null Hypothesis	Variables	Obs	Mean	Mean Diff.	Std. Error	T Value	Decision
H0	License Non-Holder	93	0.96	0.01***	0.02	7.78	H0 Rejected
	License Holder	87	0.52		0.05		

N.B: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Obs= Observation, Diff= Difference, Std.= Standard.

Source: Authors' Estimation, 2020

Appreciation of Plastic Bag Ban

Around 73 percent of the respondents do appreciate the ban on usage of plastic bags; however, the rest 27 percent do not have any idea of the regulation. Around 30 percent of the retailers have knowledge on the ban. However, instead of having prior knowledge on the ban around 40 percent retailers still provides defying the ban.

Restriction Faced by Retailers in Providing Plastic Bag to Consumers

For understanding the demand side factors it is necessary to find out whether the consumers give any restrictions in receiving plastic bag. Thus, it has been found that 6.67 percent consumers frequently opt for receiving plastic bag in day-to-day purposes. Writing elaborately 55 percent respondents never restricted the shop owners to provide the bag whereas 27 percent respondents once in a while negated receiving the plastic bags while purchasing from them.

Advantages of Using Plastic Bag

The major advantages in using a plastic bag as realized by the respondents are its lower cost (48 percent), lighter in weight (32 percent) and easiness in handling (20 percent). However, licensing, shop distance from main road, government raid, government visit, availability of variety of bags and knowledge regarding plastic bag have statistically significant impact on plastic bag providing behavior (Table 3).

Probability of Plastic Bag Providing

According to regression results, chances of having license has negative significant impact on probability of plastic bag providing behavior. The probability of providing plastic bag is 36 percent lower for license holder than license non-holders, which is statistically significant ($p < 0.01$). Again, with one km increase in shop's distance, respondents are more likely to provide HDPE plastic bag ($p < 0.1$). The scenario can be that having shop far from the main road give the retailers enough time to hide plastic bags or shut down the shop by the time of governments raid.

Table 3. Logit Model for Probability of Plastic Bag Providing

Dependent Variable Plastic Bag Providing (Yes=1, No=0)			
Explanatory Variables	Measurement Unit	Coefficient	ME
Age of the Respondent	Number of Years	0.02	0.003
Shop Distance from Main Road	Kilometer	0.01*	0.001
Having License	Yes=1; No=0	-2.96***	-0.361
Government Raid	5=VF, 4=F, 3=S, 2=LF, 1=N	-1.35**	-0.196
Restrictions Faced by Consumer	5=VF, 4=F, 3=S, 2=LF, 1=N	-0.40	-0.042
Government Visit	Number/Year	-0.14***	-0.015
Availability of Alternative Bag	5=VM, 4=M, 3=Me, 2=L, 1=VL	-1.10**	-0.147
Knowledge about Negative Environmental Effect of Plastic Bag	Index Value	-0.86**	-0.093
Shop Size	Square feet	0.0006	0.00007
Experience of the Respondent	Number of Years	0.001	0.0001
Constant		6.69***	
N			180
Pseudo R2			0.760

N.B: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

VF= Very frequently, F= Frequently, S= Sometimes, LF= Less frequently, N= Never;

VM= Very much, M= Much, Me=Medium, L=Little, VL=Very little;

SA= Strongly agree, A= Agree, N= Neutral, D= Disagree, SD= Strongly disagree.

Source: Authors' estimation, 2020

For an increase in frequency of govt. raid, probability of plastic bag providing decreases. With one scale increase in govt. raid, probability of providing HDPE plastic bag decreases by 0.196 ($p < 0.05$). Number of government visit

has negative impact on probability of plastic bag providing behavior. If number of gov't visit increases by 1 unit, probability of providing HDPE plastic bag decreases by 0.015 ($p < 0.1$).

Availability of variety of plastic bag is measured by Likert scale. This factor has negative impact on probability of plastic bag providing behavior. A one scale increase in availability of alternative of plastic bag leads to decrease in the probability of providing HDPE plastic bag by 0.147 ($p < 0.05$).

Knowledge regarding plastic bag is measured by calculating index value with the help of some statements which reflects knowledge about negative environmental effect of plastic bag. This factor has negative impact on probability of plastic bag providing behavior. From the regression result, it can be indicated that, for an increase in retailer's knowledge about negative environmental effect of plastic bag use, probability of plastic bag providing decreases. If retailer's knowledge regarding negative impact of plastic bag use increases by 1 unit, probability of providing HDPE plastic bag decreases by 0.093 ($p < 0.05$).

Discussion

It is observed that 74 percent of the respondents are providing HDPE bag which is consistent with Musa et al. (2013). In spite of having other bags like paper bag, jute bag and net bag, the retailers mostly use HDPE plastic bag for their trading purpose. If it is assumed that, providing plastic bag is violation of plastic bag ban law, then it may be predicted that 74 percent of the total respondents are avoiding plastic bag ban law. Most of the plastic bag providing retailers are from grocery shops group which is 46 percent.

Plastic bag was banned in Bangladesh in 2002. But surprisingly 73 percent of the respondents do not have knowledge on the ban. Their knowledge gap enhances the usage of plastic bag to a larger extent and is prevalent in rural communities.

Most of the consumers do not raise any objections to retailers in transferring good through plastic bags that reflects unawareness of the consumers and is responsible to certain extent is abiding the ban. Respondents who carry own bag are older in age (between 51 and 60 years) which is consistent with Gupta (2011). It is also observed that consumers between the age of 21 and 30 years don't often carry their own bag.

The study emphasizes that the vital reason for usage of plastic bags is lack of alternatives in the market as has been validated by 60 percent of the respondents. The emergence of new variant of plastic bag is a valid demand which is discussed in literature (Synthia & Kabir, 2014). However, around 25 percent of the respondents observed lack of enforcement of the ban as the cause for unrestricted use of plastic bags.

Conclusion

Plastic waste has been an alarming issue for Bangladesh. On an average, the amount of solid waste formed in major cities of the country is 24,000 tons per day, 10 percent of it is the plastic waste that was 7 percent a few years earlier. In this situation Bangladesh government executes a ban on plastic bags from 2002 in the capital city of Bangladesh which was later extended all over the Bangladesh. However, such ban is basically ineffective because of lack of alternatives and also availability and low cost. Further research may be continued on this issue by extending both its horizontal and vertical space.

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Conflict of Interest

The authors declare no conflict of interest.

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